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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/821,957 | 04/12/2004 | Takayuki Suzuki | Q80989 | 2365 |

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| EXAMINER |
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LANGMAN, JONATHAN C

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| ART UNIT | PAPER NUMBER |
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1775

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| MAIL DATE | DELIVERY MODE |
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07/20/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|---------------------------------|----------------------------------|--|
| Office Action Summary | Application No. 10/821,957 | Applicant(s) SUZUKI, TAKAYUKI | |
| | Examiner Jonathan C. Langman | Art Unit 1775 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 3-7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>6/06/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Dislocation reduction in AlN and GaN Bulk Crystals Grown by HVPE" to Albrecht et al. in view of Melnik et al. (US 6,936,357).

Regarding claim 1, Albrecht et al. teach GaN and AlN crystals grown by hybrid vapor phase epitaxy (HVPE) to thicknesses of 100-200 microns (Albrecht et al., pg 453, last line). Albrecht et al. go on to teach that the FWHM, full width at half maximum of rocking curves from a GaN bulk crystal at a diffraction plane of {11-24} plane, of less than 500 seconds (Albrecht et al., Table 1). Albrecht et al. are silent to the diameter of the crystal; however, it is well known in the art and also taught by Melnik et al. that nitride semiconductor substrate can be grown by HVPE with large diameter dimensions. Melnik et al. teach that the nitride substrate crystals will have a minimum dimension of 1 cm in the x, y, and z directions. Thus showing a crystal with a diameter of 10 mm (1 cm) or more (Melnik et al. col. 3, lines 10-17). It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to grow the Nitride semiconductor as taught by Albrecht et al. comprising a thickness of greater than 50 microns and a FWHM of less than 500 microns at {11-24}, to a diameter of 10 cm or

Art Unit: 1775

more, because Melnik et al. have shown that nitride semiconductor crystals of these diameters may be grown in the art with HVPE, (the same method of Albrecht et al.).

Furthermore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the diameter for the intended application because, where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. *In Re Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding claim 2, the crystal as taught by Albrecht et al. is never mentioned to be doped therefore it is assumed that it is undoped. Albrecht et al. teach that the dislocation (carrier) density is said to be as low as $3 \times 10^6 \text{ cm}^{-2}$ (Albrecht et al. pg 455). And in another example teach that the dislocation density ranges from 10^9 to 10^5 cm^{-2} (Albrecht et al., pg. 456), which falls within the instantly claimed ranges. Also Melnik et al. teach that the dislocation density is preferably less than 10^4 cm^{-2} (Melnik et al., col. 5, lines 5-10).

Furthermore, Melnik et al. teach that the bulk nitride semiconductor material may be doped during growth to achieve n-, l-, or p- type conductivity as desired (Melnik et al., abstract). It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to dope the structure of Albrecht et al. to any desirable conductivity. Dependent upon the specific application any dopant amount

Art Unit: 1775

may be used to achieve desired conductivities. It would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the dopant levels for the intended application to achieve desired conductivities, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 8, Albrecht et al. teach a freestanding nitride semiconductor wafer as described above, however, they are silent to the formation of a light-emitting device on the substrate. The substrate as taught by Albrecht et al. is more than capable of being used as a substrate for the formation of an LED. Furthermore, Melnik et al. teach that the GaN substrates are used in the applications of light emitting diodes where devices are formed on the GaN substrates of the invention (Melnik et al, col. 1, lines 15-40). It would have been obvious to use the substrate of Albrecht et al. to build an LED device on top, as Melnik has shown the two nitride semiconductor substrates to be functional equivalents.

Response to Arguments

The applicants amended the instant claims to include the limitation of thickness to overcome the prior art of record. Jagenathan et al. teach that the wafer is of a thickness in the sub micron range, therefore a thickness of 50 microns, (several orders larger than the prior art) is not anticipated nor deemed obvious. The rejections over Jagenathan et al. have been removed.

Applicant's arguments with respect to claims 1, 2, and 8 have been considered but are moot in view of the new ground(s) of rejection.

The amendment of the instant claims has changed the scope of the claims and necessitated a new search by the Examiner.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

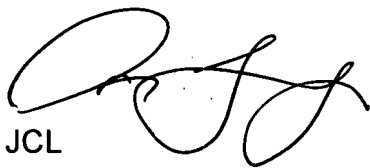
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan C. Langman whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri 9:00 am - 4:30 pm EST.


Art Unit: 1775

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



JCL



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SUPERVISORY PATENT EXAMINER
7/17/7